

What is claimed is:

1 1. A method of arranging microspheres with liquid,
2 comprising the steps of:
3 providing a semiconductor device that includes a
4 semiconductor wafer with a predetermined semiconductor element
5 and an interconnection and with a number of pads connected the
6 interconnection and attached on a surface of the semiconductor
7 wafer, and a **resist** formed on the semiconductor wafer and having
8 a penetrating hole formed at the respective pad positions to
9 mount the microsphere; and
10 pouring the microsphere into the hole together with
11 conductive liquid to mount the microsphere on the pad.

1 2. A method of arranging microspheres with liquid,
2 comprising the steps of:
3 providing a semiconductor device that includes a
4 semiconductor wafer with a predetermined semiconductor element
5 and an interconnection and with a number of pads connected the
6 interconnection and attached on a surface of the semiconductor
7 wafer, and a **mask** with a penetrating hole formed at the
8 respective pad positions to mount the microsphere, the mask
9 being held on the semiconductor device to allow the hole to be
10 disposed on the pad; and
11 pouring the microsphere into the hole together with
12 conductive liquid to mount the microsphere on the pad.

1 3. A microsphere arranging apparatus, comprising:
2 a mounting means for mounting a semiconductor device that

3 includes a semiconductor wafer with a predetermined
4 semiconductor element and an interconnection and with a number
5 of pads connected the interconnection and attached on a surface
6 of the semiconductor wafer, and a resist formed on the
7 semiconductor wafer and having a penetrating hole formed at the
8 respective pad positions to mount the microsphere;

9 a storing means for storing conductive liquid containing
10 a number of microspheres and for supplying the microsphere
11 together with the stored conductive liquid to the semiconductor
12 device mounted on the mounting means; and

13 a retaining means for retaining the conductive liquid
14 containing the microsphere supplied from the storing means to
15 the semiconductor device.

1 4. A microsphere arranging apparatus, comprising:

2 a mounting means for mounting a semiconductor device that
3 includes a semiconductor wafer with a predetermined
4 semiconductor element and an interconnection and with a number
5 of pads connected the interconnection and attached on a surface
6 of the semiconductor wafer, and a resist formed on the
7 semiconductor wafer and having a penetrating hole formed at the
8 respective pad positions to mount the microsphere;

9 a storing means for storing conductive liquid containing
10 a number of microspheres and for supplying the microsphere
11 together with the stored conductive liquid to the semiconductor
12 device mounted on the mounting means;

13 a retaining means for retaining the conductive liquid
14 containing the microsphere supplied from the storing means to
15 the semiconductor device;

16 a tube that connects between the storing means and the
17 retaining means; and

18 a pump means that is built in the tube to transport the
19 conductive liquid containing the microsphere being retained in
20 the retaining means to the storing means.

1 5. The microsphere arranging apparatus according to claim
2 4, wherein:

3 the pump means comprises a base, a rotating means to rotate,
4 and a plurality of rollers that are rotatably attached to the
5 circumference of the rotating means;

6 the tube is a flexible tube disposed between the roller
7 and the base; and

8 a clearance between the roller and the tube disposed is
9 provided so as to have a gap that allows the microsphere
10 contained in the conductive liquid to pass through inside the
11 tube while having its original shape when the tube is pressed
12 by the rotation of the roller.

1 6. A microsphere arranging apparatus, comprising:

2 a mounting means for mounting a semiconductor device that
3 includes a semiconductor wafer with a predetermined
4 semiconductor element and an interconnection and with a number
5 of pads connected the interconnection and attached on a surface
6 of the semiconductor wafer, and for holding a mask with a
7 penetrating hole formed at the respective pad positions to mount
8 the microsphere so as to allow the hole to be disposed on the
9 pad;

10 a storing means for storing conductive liquid containing

11 a number of microspheres and for supplying the microsphere
12 together with the stored conductive liquid through the **mask** to
13 the semiconductor device mounted on the mounting means; and
14 a retaining means for retaining the conductive liquid
15 containing the microsphere supplied from the storing means to
16 the semiconductor device.

1 7. A microsphere arranging apparatus, comprising:
2 a mounting means for mounting a semiconductor device that
3 includes a semiconductor wafer with a predetermined
4 semiconductor element and an interconnection and with a number
5 of pads connected the interconnection and attached on a surface
6 of the semiconductor wafer, and for holding a **mask** with a
7 penetrating hole formed at the respective pad positions to mount
8 the microsphere so as to allow the hole to be disposed on the
9 pad;
10 a storing means for storing conductive liquid containing
11 a number of microspheres and for supplying the microsphere
12 together with the stored conductive liquid through the **mask** to
13 the semiconductor device mounted on the mounting means;
14 a retaining means for retaining the conductive liquid
15 containing the microsphere supplied from the storing means to
16 the semiconductor device;
17 a tube that connects between the storing means and the
18 retaining means; and
19 a pump means that is built in the tube to transport the
20 conductive liquid containing the microsphere being retained in
21 the retaining means to the storing means.

1 8. A microsphere arranging apparatus, comprising:
2 a mounting means for mounting a semiconductor device that
3 includes a semiconductor wafer with a predetermined
4 semiconductor element and an interconnection and with a number
5 of pads connected the interconnection and attached on a surface
6 of the semiconductor wafer, and a resist formed on the
7 semiconductor wafer and having a penetrating hole formed at the
8 respective pad positions to mount the microsphere;
9 a storing means for storing conductive liquid containing
10 a number of microspheres and for supplying the microsphere
11 together with the stored conductive liquid to the semiconductor
12 device mounted on the mounting means;
13 a retaining means for retaining the conductive liquid
14 containing the microsphere supplied from the storing means to
15 the semiconductor device;
16 a tube that connects between the storing means and the
17 retaining means; and
18 a vertical movement means that allows the storing means
19 to move to a position above or below the retaining means.

1 9. A microsphere arranging apparatus, comprising:
2 a mounting means for mounting a semiconductor device that
3 includes a semiconductor wafer with a predetermined
4 semiconductor element and an interconnection and with a number
5 of pads connected the interconnection and attached on a surface
6 of the semiconductor wafer, and for holding a mask with a
7 penetrating hole formed at the respective pad positions to mount
8 the microsphere so as to allow the hole to be disposed on the
9 pad;

10 a storing means for storing conductive liquid containing
11 a number of microspheres and for supplying the microsphere
12 together with the stored conductive liquid through the mask to
13 the semiconductor device mounted on the mounting means;

14 a retaining means for retaining the conductive liquid
15 containing the microsphere supplied from the storing means to
16 the semiconductor device;

17 a tube that connects between the storing means and the
18 retaining means; and

19 a vertical movement means that allows the storing means
20 to move to a position above or below the retaining means.

1 10. A semiconductor device, comprising:

2 a semiconductor wafer with a predetermined semiconductor
3 element and an interconnection and with a number of pads
4 connected the interconnection and attached on a surface of the
5 semiconductor wafer; and

6 a resist formed on the semiconductor wafer and having a
7 penetrating hole formed at the respective pad positions to mount
8 the microsphere,

9 wherein the resist has a thickness that allows the
10 microsphere to be retained in the hole and prevents the two or
11 more microspheres from being entered therein.

1 11. A semiconductor device, comprising:

2 a semiconductor wafer with a predetermined semiconductor
3 element and an interconnection and with a number of pads
4 connected the interconnection and attached on a surface of the
5 semiconductor wafer; and

6 a resist formed on the semiconductor wafer and having a
7 penetrating hole formed at the respective pad positions to mount
8 the microsphere,

9 wherein a minimum diameter of the hole to be generated
10 due to a manufacture accuracy of the hole is made to be greater
11 than a value obtained by adding a gap to a maximum diameter of
12 the microsphere, and a maximum diameter of the hole is made to
13 prevent the two or more microspheres from being entered into
14 the one hole and prevent the microsphere from being released
15 from the pad.

1 12. A semiconductor device, comprising:

2 a semiconductor wafer with a predetermined semiconductor
3 element and an interconnection and with a number of pads
4 connected the interconnection and attached on a surface of the
5 semiconductor wafer; and

6 a resist formed on the semiconductor wafer and having a
7 penetrating hole formed at the respective pad positions to mount
8 the microsphere,

9 wherein the resist has a thickness that allows the
10 microsphere to be retained in the hole and prevents the two or
11 more microspheres from being entered therein, a minimum
12 diameter of the hole to be generated due to a manufacture
13 accuracy of the hole is made to be greater than a value obtained
14 by adding a gap to a maximum diameter of the microsphere, and
15 a maximum diameter of the hole is made to prevent the two or
16 more microspheres from being entered into the one hole and
17 prevent the microsphere from being released from the pad.

1 13. A semiconductor device, comprising:
2 a semiconductor wafer with a predetermined semiconductor
3 element and an interconnection and with a number of pads
4 connected the interconnection and attached on a surface of the
5 semiconductor wafer; and
6 a resist formed on the semiconductor wafer and having a
7 penetrating hole formed at the respective pad positions to mount
8 the microsphere,
9 wherein the resist has a thickness that allows a plurality
10 of the microspheres to be accommodated in the hole.

1 14. A semiconductor device, comprising:
2 a semiconductor wafer with a predetermined semiconductor
3 element and an interconnection and with a number of pads
4 connected the interconnection and attached on a surface of the
5 semiconductor wafer; and
6 a resist formed on the semiconductor wafer and having a
7 penetrating hole formed at the respective pad positions to mount
8 the microsphere,
9 wherein the hole is formed tapered such that the
10 semiconductor wafer side is wider than the resist surface side.

1 15. A semiconductor device, comprising:
2 a semiconductor wafer with a pad formed in a predetermined
3 pattern on its surface;
4 a resist formed on the semiconductor wafer and having a
5 hole formed in the predetermined pattern at a corresponding
6 position to the pad; and
7 a microsphere accommodated in the hole,

8 wherein the hole is provided with a relief means to release
9 a conductive liquid and a gas left in the hole outside the hole
10 when the microsphere is supplied together with the conductive
11 liquid.

1 16. A method of arranging microspheres with liquid,
2 comprising the steps of:

3 providing a semiconductor device that includes a
4 semiconductor wafer with a predetermined semiconductor element
5 and an interconnection and with a number of pads connected the
6 interconnection and attached on a surface of the semiconductor
7 wafer, and a resist formed on the semiconductor wafer and having
8 a penetrating hole formed at the respective pad positions to
9 mount the microsphere; and

10 pouring the microsphere into the hole together with
11 conductive liquid while rotating the semiconductor device to
12 mount the microsphere on the pad.

1 17. A method of arranging microspheres with liquid,
2 comprising the steps of:

3 providing a semiconductor device that includes a
4 semiconductor wafer with a predetermined semiconductor element
5 and an interconnection and with a number of pads connected the
6 interconnection and attached on a surface of the semiconductor
7 wafer, and a resist formed on the semiconductor wafer and having
8 a penetrating hole formed at the respective pad positions to
9 mount the microsphere;

10 disposing the semiconductor device to be inclined; and
11 pouring the microsphere into the hole together with

12 conductive liquid while oscillating an ejection means for
13 ejecting the microsphere together with the conductive liquid
14 between one end to the other end of the semiconductor device
15 over the inclined semiconductor device so as to mount the
16 microsphere on the pad.

1 18. A method of arranging microspheres with liquid,
2 comprising the steps of:

3 providing a semiconductor device that includes a
4 semiconductor wafer with a predetermined semiconductor element
5 and an interconnection and with a number of pads connected the
6 interconnection and attached on a surface of the semiconductor
7 wafer, and a mask with a penetrating hole formed at the
8 respective pad positions to mount the microsphere, the mask
9 being held on the semiconductor device to allow the hole to be
10 disposed on the pad; and

11 pouring the microsphere into the hole together with
12 conductive liquid while rotating the semiconductor device to
13 mount the microsphere on the pad.

1 19. A method of arranging microspheres with liquid,
2 comprising the steps of:

3 providing a semiconductor device that includes a
4 semiconductor wafer with a predetermined semiconductor element
5 and an interconnection and with a number of pads connected the
6 interconnection and attached on a surface of the semiconductor
7 wafer, and a mask with a penetrating hole formed at the
8 respective pad positions to mount the microsphere, the mask
9 being held on the semiconductor device to allow the hole to be

10 disposed on the pad;

11 disposing the semiconductor device to be inclined; and

12 pouring the microsphere into the hole together with

13 conductive liquid while oscillating an ejection means for

14 ejecting the microsphere together with the conductive liquid

15 between one end to the other end of the semiconductor device

16 over the inclined semiconductor device so as to mount the

17 microsphere on the pad.

1 20. A microsphere arranging apparatus, comprising:

2 a mounting-rotating means for mounting a semiconductor

3 device and for rotating the semiconductor device mounted, the

4 semiconductor device including a semiconductor wafer with a

5 predetermined semiconductor element and an interconnection and

6 with a number of pads connected the interconnection and attached

7 on a surface of the semiconductor wafer, and a resist formed

8 on the semiconductor wafer and having a penetrating hole formed

9 at the respective pad positions to mount the microsphere;

10 a storing means for storing conductive liquid containing

11 a number of microspheres and for supplying the microsphere

12 together with the stored conductive liquid to the semiconductor

13 device mounted on the mounting-rotating means; and

14 a retaining means for retaining the conductive liquid

15 containing the microsphere supplied from the storing means to

16 the semiconductor device.

1 21. A microsphere arranging apparatus, comprising:

2 a mounting means for mounting a semiconductor device

3 while disposing the semiconductor device to be inclined, the

4 semiconductor device including a semiconductor wafer with a
5 predetermined semiconductor element and an interconnection and
6 with a number of pads connected the interconnection and attached
7 on a surface of the semiconductor wafer, and a resist formed
8 on the semiconductor wafer and having a penetrating hole formed
9 at the respective pad positions to mount the microsphere;
10 a storing means for storing conductive liquid containing
11 a number of microspheres;
12 a first ejection tube for ejecting the microsphere
13 together with the conductive liquid;
14 an oscillating means for oscillating the first ejection
15 tube between one end to the other end of the semiconductor device
16 over the semiconductor device inclined; and
17 a retaining means for retaining the conductive liquid
18 containing the microsphere ejected from the first ejection tube
19 to the semiconductor device.

1 22. A microsphere arranging apparatus, comprising:
2 a mounting-rotating means for mounting a semiconductor
3 device and for rotating the semiconductor device mounted, the
4 semiconductor device including a semiconductor wafer with a
5 predetermined semiconductor element and an interconnection and
6 with a number of pads connected the interconnection and attached
7 on a surface of the semiconductor wafer, and for holding a mask
8 with a penetrating hole formed at the respective pad positions
9 to mount the microsphere so as to allow the hole to be disposed
10 on the pad;
11 a storing means for storing conductive liquid containing
12 a number of microspheres and for supplying the microsphere

13 together with the stored conductive liquid to the pad on the
14 semiconductor device mounted on the mounting-rotating means;
15 and
16 a retaining means for retaining the conductive liquid
17 containing the microsphere supplied from the storing means to
18 the pad.

1 23. A microsphere arranging apparatus, comprising:
2 a mounting means for mounting a semiconductor device
3 while disposing the semiconductor device to be inclined, the
4 semiconductor device including a semiconductor wafer with a
5 predetermined semiconductor element and an interconnection and
6 with a number of pads connected the interconnection and attached
7 on a surface of the semiconductor wafer, and for holding a mask
8 with a penetrating hole formed at the respective pad positions
9 to mount the microsphere so as to allow the hole to be disposed
10 on the pad;
11 a storing means for storing conductive liquid containing
12 a number of microspheres;
13 a first ejection tube for ejecting the microsphere
14 together with the conductive liquid;
15 an oscillating means for oscillating the first ejection
16 tube between one end to the other end of the semiconductor device
17 over the pad of the semiconductor device; and
18 a retaining means for retaining the conductive liquid
19 containing the microsphere ejected from the first ejection tube
20 to the pad.

1 24. A microsphere arranging apparatus, comprising:

2 a mounting-rotating means for mounting a semiconductor
3 device and for rotating the semiconductor device mounted, the
4 semiconductor device including a semiconductor wafer with a
5 predetermined semiconductor element and an interconnection and
6 with a number of pads connected the interconnection and attached
7 on a surface of the semiconductor wafer, and for holding a mask
8 with a penetrating hole formed at the respective pad positions
9 to mount the microsphere so as to allow the hole to be disposed
10 on the pad;

11 a storing means for storing conductive liquid containing
12 a number of microspheres and for supplying the microsphere
13 together with the stored conductive liquid to the pad on the
14 semiconductor device mounted on the mounting-rotating means;

15 a retaining means for retaining the conductive liquid
16 containing the microsphere supplied from the storing means to
17 the pad;

18 a tube that connects between the storing means and the
19 retaining means; and

20 a vertical movement means that allows the storing means
21 to move to a position above or below the retaining means.

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